AN EXAMINATION

OF

Mr. FERGUSON's REMARKS

(Inſerted in the CRITICAL REVIEW for *May* 1763.)

UPON

Mr. KENNEDY's Syſtem of Aſtronomical Chronology.

By JOHN KENNEDY.

LONDON:
Printed for the AUTHOR,
And Sold by Meſſrs. DAVIS and REYMERS, in *Holborn*; Mr. OWEN, near *Temple-Bar*; and Mr. ALLEN, Printer, in *Bolt-Court*, *Fleet-Street*.

[Price Six-pence.]

Where may be had, delivered *gratis* to the Author's Subſcribers, *A Compendious Method, by one ſimple Principle of Aſtronomy, of eſtimating and correcting the Defects and Redundancies in the ſeveral Syſtems of Chronology extant.*

WELLCOME INSTITUTE LIBRARY

A CANDID
EXAMINATION
OF
Mr. FERGUSON'S REMARKS
UPON
Mr. KENNEDY'S Syſtem of Aſtronomical Chronology.

SIR,

I Have carefully peruſed your REMARKS upon my book; I found them inſerted in the *Critical Review* publiſhed for *May* 1763. I need not ſay, that an examination of my book required ſome ſmall acquaintance with the firſt elements of aſtronomy; and you have with propriety ſtepped forth, in your aſtronomical capacity, although not ſo much a critical reviewer of my ſcheme, as a ſtrenuous oppoſer of its fundamental principles.

Before I proceed farther, it is neceſſary to obſerve, that you ſeem to have miſtaken (and I have long ſince imagined, from the conferences I have had with you, that you would miſtake) my book for a profeſſed treatiſe of Aſtronomy; whereas the title might have certified you, that it is a profeſſed treatiſe of Chronology. And notwithſtanding I have entitled it, *A Syſtem of Aſtronomical Chronology*, and expreſly ſay, Diſſert. i. p. 115, "That Chronology is "founded on Aſtronomy, and ſo intimate is the connection, that the conclu- "ſions of the one are properly aſſumed in ſupport of the other," yet it muſt appear to the moſt curſory reader, that the term *Aſtronomy*, is uſed by me, throughout my work, in a very narrow and limited ſenſe; that it comprehends no more, and extends no farther, than to the following particulars, namely, firſt, the determinate poſition of the ſun and moon in the beginning of (what I call) the year of the creation. 2dly, A true ſeries of years from that epoch to the preſent times. 3dly. The determinate length of the ſolar tropical year. 4thly, Of the ſolar day. 5thly, Of a mean lunation. 6thly, A meridian diſtance. 7thly, The ſolar period. 8thly, The lunar period. Upon this baſis I erect my ſuperſtructure, and by theſe principles all my numerical calculations (which you have paſſed over in ſilence) are conſtantly regulated. And although ſome readers, who are inclined to judge favourably of my work, have given it as their opinion, that they are quite ſufficient for the purpoſes of Chronology, and for thoſe purpoſes they were intended; yet, in my own eſtimation, they are far from being ſufficient to denominate their author a perfect phyſical aſtronomer, or ſuch a one as you injudiciouſly expect the Chronologiſt ſhould be.

When you entered upon the examination of my Syſtem of Chronology, you needed not to have conſidered yourſelf in any higher capacity than that of a conſtructer and publiſher of ſolar and lunar tables, and, at the higheſt, no more than a calculator of luni-ſolar characters, that is, of the mean diſtances of the moon from the ſun (and a very extraordinary ſpecimen of this branch of your ſkill, I ſhall bye and bye lay before you) at the four cardinal points, in any given year, in any given interval, not exceeding the bounds of my chronological table.

This being premiſed, I cannot readily account for the motives which could lead you to introduce your planets, and your phyſical arguings, into the ſimplicity of my ſcheme; which confines its numerical calculations to the times of equinoxes and ſolſtices, to mean new moon, and mean full moon days, with their correſponding days of the week. A ſpecies of aſtronomy this, which any perſon of common capacity, may attain to the knowledge and practice of, in a very ſhort time, without much intenſeneſs or acuteneſs of thought. I cannot therefore, I ſay, readily account for ſuch incongruous proceeding, unleſs I may aſcribe it to an overweening ambitious deſire of giving a full diſplay of your ſuperior ſkill, in theory and ſpeculation, in the ſublimities, and in the depths of ſcience; not conſidering, in the mean while, (and yet, as my examiner, you ought to have conſidered) that the more plain and ſimple any principles are, the more likely to be original: I will venture to call this an axiom.

Full ten months have paſſed ſince I put my book into your hands, and the moſt ſuperficial peruſal of it would have diſcovered to you, that taking the whole of it together, it was of a very miſcellaneous nature; that it conſiſted of ſeveral parts of ſeveral kinds, namely, Hiſtorical, Chronological, Theological, and in a limited ſenſe Aſtronomical. This limited aſtronomical part, ſeems hitherto to have engroſſed your attention; the whole of your animadverſions center there. I would not willingly miſrepreſent you; it is far from my intentions to do it; and I believe what follows, will be found a pretty exact enumeration of the ſeveral particulars which are contained in your Critical Review. I have ſet them down in the form of queries, and they are propoſed as diſtinct articles, which may or may not be made the ſubjects of ſome future enquiries and diſcuſſions.

QUERY I. Whether the aſtronomers, by all the obſervations that have ever yet been made, ſince the foundation of obſervatories, have been able to aſcertain indubitably the *determinate length* of the ſolar tropical year? or whether they do not *diſavow its determinate length?* *Ferguſon's* Review, p. 329, 339, 340.

QUERY II. Whether 365 days, 5 hours, 49 minutes, do not conſtitute the *determinate length* of the ſolar tropical year? p. 329.

QUERY III. Whether this *determinate length* of the ſolar tropical year be not ever commenſurate to itſelf, without being liable to diminution or encreaſe, from any aſſignable phyſical cauſes whatever?

QUERY IV. Whether 29 d. 12 h. 44 min. 1 ſec. 45 thirds, do not conſtitute the preciſe mathematical meaſure of a mean lunation? p. 329.

QUERY V. Whether the tables made upon the foregoing numbers, if reſpect be had to mathematical preciſion in calculation, are not preferable to all other ſolar and lunar tables whatever? p. 330.

QUERY VI. Whether Mr. Ferguſon can prove, that not only the ſun and moon, but even the ſtars alſo in their courſes militate againſt Mr. Kennedy's Syſtem of Chronology, and jointly tend to deſtroy his ſuperſtructure built upon a *fictitious* and *chimerical* baſis? p. 330.

QUERY VII. Whether the ſeveral definitions of a ſolar day, which occur in the writings of the aſtronomers, are or are not reconcileable with one anoteer, when compared together? p. 330.

QUERY VIII. Whether Mr. Kennedy's definition of a ſolar day will be admitted or rejected by the aſtronomers? p. 330.

QUERY IX. Whether the difference between the ſolar day and the ſidereal day be 4 minutes preciſely, or 3 min. 56 ſec.? p. 330, 331.

QUERY X. Whether nature has made the ſidereal day as incommenſurate to the ſolar, as the ſide of a ſquare is to its diagonal? p. 331.

QUERY XI. Whether if the fixed ſtars appear to go round the earth, or the earth makes an abſolute turn on its axis in 23 h. 56 min. 4 ſec. (as Mr. F. has ſtated it in his Treatiſe of Aſtronomy) the circumference of the earth's equator will contain 360 degrees, as all circles are computed by common agreement, or 359 degrees, 1 minute, and no more? p. 331.

QUERY XII. Whether, if $11' \; 3'' \; 39'''$ be the exceſs of the Julian above the ſolar tropical year, (as Mr. F. has defined it) Sir I. Newton, Dr. Halley, and

and the late Rev. Dr. Bradley, &c. were not as ignorant of the determinate length of the ſolar tropical year, as Mr. K. is? p. 332.

Query XIII. Whether if Mr. F's meaſure of a ſidereal day, which he has made to conſiſt of 23 h. $56'$, $4''$, $6'''$, 00^{4ths}, 29^{5ths}, 33^{6ths}, 21^{7ths}, 36^{8ths}, be not an irregular, diſtorted, and deformed number; the mere reſult of a mis-ſtated proportion, which neither nature will acknowledge, nor any celeſtial obſervation confirm? p. 333.

Query XIV. Whether Mr. Keil's numbers, or Mr. Ferguſon's numbers, or Mr. Kennedy's numbers, rightly expreſs, 1ſt, the quantity of the earth's diurnal progreſſive motion; 2dly, the earth's diurnal rotative motion; 3dly, the quantity of a ſolar day, of a ſidereal day, and the difference? p. 33.

Query XV. Whether 365 ſolar days include 366 ſidereal days preciſely, or 366 ſidereal days and 20 min. of the 367th? p. 333, 334.

Query XVI. Whether Mr. Kennedy or Mr. Ferguſon has rightly explain'd his own geometrical ſcheme, repreſenting the ſun and earth in conjunction with a fixed ſtar at noon? p. 334, 335.

Query XVII. Whether, if the mariner *had the means* of finding the exact moment of a certain fixed ſtar's culmination, in any of the great ſeas, any circumſtance would be wanting to determine his longitude, as he might carry an unerring celeſtial clock round the world with him, for the connection of meridians? p. 334.

Query XVIII. Whether Mr. Kennedy's ſaying, the equations of time (anſwering to the ſun's mean anomaly or diſtance from its apogee) are *unaſtronomical*, and that *equal* time and *true* time are a diſtinction without a difference, does not betray his ignorance of a well-known principle of ſcience? p. 336.—A query this, ſo big with abſurdities, that Mr. F. wiſhes, for the Author's ſake, it never had been printed.

But notwithſtanding theſe benevolent wiſhes, I expect, and have a right to demand, a full and clear confutation (not by mere phyſical arguments, but by calculation, confirmed by a near agreement with ſome celeſtial obſervation) of thoſe proofs which I have offered (ſee p. 199 to 208 incluſive) in ſupport of my abſurdities.

The tabular calculation which is inſerted p. 206, is your own; I had only the honour of tranſcribing it from your manuſcript; and you are anſwerable for its errors, if there be any in it.

But before you meditate ſuch confutation, as I have here preſcribed to you, and have a right to expect from you, it may be neceſſary to give a little attention to the contents of the following query.

QUERY XIX. Whether nature has divided the ecliptic, or the earth's annual orbit, into 360 degrees, equal to the number of days in the old Egyptian or Chaldean year; or into 365 degrees, and almoſt one fourth part of another, equal to the time in which the earth performs its annual revolution? p. 331.

Now leaving you to anſwer the contents of query xix. at your leiſure, and to confute thoſe proofs which I have offered in ſupport of my abſurdities, I ſhall proceed to

QUERY XX. Whether Mr. Kennedy muſt not prove, that the moon muſt be either new or full at the termination of every ſolar tropical year, before he can offer to prove that the ſolar year is always of the ſame length to a mathematical exactneſs? p. 340. To this I oppoſe,

QUERY XXI. Whether Mr. Ferguſon muſt not prove, that not one of Dr. Bradley's five obſervations, which I have ſelected, is *true*, before he can offer to prove the ſolar year is not always of the ſame length to a mathematical exactneſs?

QUERY XXII. Whether the author of nature, in the original conſtitution of the ſyſtem, did or did not intend, any *regularity*, any *harmony*, any *uniformity?* p. 334.

QUERY XXIII. Whether the diſagreement and inconſiſtency which appears by comparing together the fifteen obſervations of equinoxes and ſolſtices, made by the late reverend Dr. Bradley, is *not at leaſt a good preſumptive argument of their juſtneſs*, and of a due correſpondency with the *intended* and *eſtabliſhed irregularity* of nature? p. 341.

You ſee what a large field of controverſy and diſpute your critical review of my plain ſimple ſyſtem of chronology has opened; but without entering into this ſpacious field at preſent, (I do not ſay I never will) ſome particulars with which I am more immediately concerned demand my attention. In p. 342, and 343, you erect your batteries againſt my foundation-principles; and if your batteries are of ſufficient ſtrength, the ſuperſtructure muſt fall with its foundation, and be buried in the ſame ruins; I muſt therefore haſten to its defence. In theſe pages you write as follows.

"From the Moſaic writings, Mr. Kennedy infers," (p. 155) and ſays, that "he ſhall ſupport the deduction by accumulated proofs; that, at the "creation, the autumnal equinox was coincident with a *full moon*;" and in p. 158, that "time commenced, at the autumnal equinox, in coincidence "with a *full moon*, on the fourth day of the firſt week at noon." See alſo p. 392, and 393; in the laſt of which he tells us, "that the Meſſiah was "born on the firſt day of the feaſt of tabernacles."

" Here Mr. Kennedy's words ſeem to aſſert, in terms as plain as can " be imagined, that the firſt autumnal equinox fell on the fourth day of the " creation-week, at noon; and that the moon was full at the very inſtant of " the equinox, ſince they could not otherwiſe be coincident. But this " aſſertion in p. 158 is rendered ſomewhat obſcure, by a note at the foot of " the page, which ſays, the full moon day begins on the third day at noon, " with a mathematical preciſion; hence it comes to paſs, that the earth's annual motion is dated from the autumnal equinox, and the extreme point " of the full-moon day.

" But, as it is not expreſſed in this note, whether the moon was full on " the firſt or laſt point of the day; and it would be hard to find any reaſon " why the earth's annual motion ſhould commence from the noon of the fourth " day, becauſe the full-moon day begins on the third day at noon, and ends " on the fourth day at noon; and as we are thrice told, (p. 155, 158, 192) " that the original equinox and full moon were coincident, I cannot ſee how " this can be underſtood in any other ſenſe, than that the original equinox, " and the original full moon, fell at the inſtant of noon on the fourth day " of the creation-week."

Theſe paragraphs are ſo debaſed with cavil, that I cannot think they will do much honour to a Critical Review.

I ſincerely wiſh, that not one error of the preſs, not one inaccuracy of expreſſion, not one *inadvertency* could have been found in ſo long a work; but ſuch wiſhes come too late.—Of the latter kind you have, with joy inexpreſſible, pointed out to every reader no leſs than three inſtances, and here ſpecified the pages; I acknowledge it; but if you will give yourſelf the trouble to take your pen, and add the word *day* to full moon, and you muſt know that I meant it from your own citation, then the inadvertency will be corrected.

In my Introductory Diſcourſe, p. iii. I have expreſſed the ſame article in the following terms: time commenced at our autumnal equinox, on the fourth day of the creation, in coincidence with a *full-moon day*, or the 15th day of the firſt month of the firſt lunar year, reckoned from that evening in which the moon generally makes its firſt appearance after its conjunction.

I do not aſk whether you believe this? I only aſk, whether it is ſo intelligibly expreſſed, as to be out of the reach of cavil?—— I ſhall now return to your remarks.

" In p. 221, Mr. Kennedy ſays, that the original equinox was October " the 25th, at 0 h. 0 min 0 ſec. (that is, preciſely at noon) and the original " full moon was October the 24th, at 0 h. 0 min. 0 ſec.—ſo that, here he

" makes

" makes the original full moon to have been juſt 24 hours before the original " equinox; and the ſame thing is again ſaid in p. 562. N. B. *If we " compute by Halley's and Pound's tables, founded on their own obſervations, " we ſhall have October 23d for the day of full moon, and October 24th for " the day of the autumnal equinox, (in the year 4007 before the year of " Chriſt's birth, which Mr. Kennedy aſſigns for the year of creation) each " one day ſooner than his numbers make it.*

" —— I confeſs, it does not appear plain to me, that the words *haju le-" moadim*, recorded by Moſes to be ſpoken by the Almighty himſelf, and " which Mr. Kennedy interprets, *Let the ſun and moon be appointed, among " other original deſignations, for the regulation of feſtival days*, are any proof " that the moon was created full, either at the inſtant of the autumnal equi-" nox, in a meridian taken in the boſom of the Great South Sea, or juſt 24 " hours before it; nor that, at the autumnal equinox, in the firſt year of the " reign of our preſent ſovereign George the Third, the world was juſt 5768 " years old, altho' Mr. Kennedy tells us, that it was then neither more nor leſs."

To this I ſhall ſubjoin a paragraph which occurs in p. 334. " It is ſome-" what particular, if not very much ſo, that he tells us, (p. 225) that our " aſtronomical tables can neither confirm the truth of his calculations, nor " convict them of error; —— ſo cheap does he hold them; but it is well " that we have facts to appeal to, and by theſe, *both his tables and ours ſhall " be tried.*"

Here, in the form of a challenger, you throw down your gauntlet, and I, without any heſitation, take it up.

In order to try both your tables and mine, you will appeal to facts, you ſay; it is agreed.

Every celeſtial phænomenon, which either has been, or may hereafter be obſerved, is ſuch a fact as we have agreed to appeal to. I ſhall begin with an example taken from the current year. Your own ſolar tables, and your tables of mean lunations, will inform you, that the ſun will come to the autumnal equinox, in this current year of our Lord 1763, upon a full moon day; whoſe mean diſtance before the next autumnal equinox, as the radical numbers of your own tables declare, will be ſomewhat leſs than 24 hours.

I have collected from the evidences of ſacred and profane hiſtory, 5770 years, in the interval from the creation to the current year incluſive. A. D. 1763 falls in with the year of the Julian period 6476, from which ſubſtract 5770, and it will carry it back to the autumnal equinox in the year of the Julian period 706; which is the radical year, with reſpect to my interval.

To find the luni-ſolar characters, or the mean diſtance of the moon from the ſun, at the autumnal equinox, in the radical year of the Julian period 706.

The difficulties which attend the inveſtigation of luni-ſolar characters, in any given year, in the moſt remote ages of the world, I have endeavoured to ſet forth, in my Introductory Diſcourſe, p. v. vi. in the following terms.

There are within the limits of every ſolar year, two equinoxes and two ſolſtices, which are called the cardinal points of the year; each of theſe cardinal points hath its attending moon; if a new moon comes before, then a full moon follows after, or falls upon it. Theſe diſtances of the new moons and full moons, before and after the equinoxes and ſolſtices, are limited and various. This variety ſets them quite out of the reach of conjecture; ſo that if any year, and any one of the cardinal points be given, ſuppoſe the year of the Julian period 706, and the autumnal equinox of that year; there are but three poſſible ways of knowing the diſtance of the moon from the ſun, namely, 1ſt. by obſervation; 2dly. by tabular calculation; 3dly. by hiſtorical evidence.

The *original poſition* of the ſun and moon could not have been known by obſervation, becauſe there was no human witneſs to creation.

It cannot be aſcertained by tabular calculation, becauſe amidſt the variety of calculated poſitions, we have no means of knowing which was original, and which was not

And, therefore, if it cannot be known from hiſtorical evidence, if it be not recorded in the writings of Moſes, it ever muſt remain amongſt the inacceſſible truths.

Now I ſhall take it for granted, that you do not expect any aſſiſtance from a celeſtial obſervation made in ſuch a remote age of the world.

Hiſtorical evidence you ſo totally diſregard, from pre-occupation of judgment, that it has no more weight with you, makes no more impreſſion upon your mind, than the reveries of a ſick man's dream; though heaven itſelf may have given a ſanction to its truth.

Conſequently you have no expedient left but tabular calculation; concerning which I ſhall recall to your memory one or two anecdotes.

Sometime ago I propoſed to you this queſtion, namely, What would be the diſtance of the moon from the ſun, if a calculation was made backwards, from the autumnal equinox A. D. 1758, through an interval of 5765 years? To this queſtion you gave me the following anſwer in writing, which I have now in my hands.

" In the year of the Julian period 706, the mean time of full moon in October was the 22d day at 8 h. 3 min. in the evening. But the autumnal " equi-

“ equinox was on the 26th day, which being four days after, the full moon
“ was then 48 degrees paſt her oppoſition to the ſun.”

A little before you went to Briſtol this laſt winter, you unwittingly put into my hands an aſtronomical pamphlet which you had juſt publiſhed. Upon the peruſal of it, I found another calculation for the year of the Julian period 706, but I found alſo a very different reſult. According to your laſt calculation,

	D.	H.	Min.	Sec.
The ſun entered libra at London A. J. P. 706, Oct.	23	16	57	00
The mean time of full moon at London was Oct.	22	8	6	11
Mean diſtance of the moon from the ſun	1	8	50	49

By your former calculation the mean diſtance of the moon from the ſun was 48 degrees, or four compleat days; and the difference between your two calculations is 2 d. 15 h. 9 min. 11 ſec. *How theſe two calculations can be reconciled with each other, I confeſs I do not underſtand, and ſhall therefore leave that paradox for Mr. Ferguſon himſelf to ſolve.*

You have lately publiſhed ſolar and lunar tables, which I have examined, and beg your patience whilſt I point out to you your ſtrange *fluctuations* and *uncertainties*, and honeſtly exert my endeavours, at leaſt to make you ſuſpect your abilities, for the nice, the difficult, the very arduous taſk of conſtructing ſuch luni-ſolar tables, which ſhall involve no error, not the leaſt particle of exceſs or defect, in any given interval, in any given year, paſt, preſent, or to come.

To this end I muſt obſerve to you, that in the firſt and ſecond edition of your book of aſtronomy, you ſuppoſe, with Sir Iſaac Newton, the ſolar tropical year to conſiſt of 365 d. 5 h. 48 min. 57 ſec. and upon this meaſure your ſolar tables are conſtructed.

With reſpect to the meaſure of a mean lunation, you ſuppoſe, with Ptolemy and the Jews, that it conſiſts of 29 d. 12 h. 44 min. 3 ſec. 20 thirds; and upon this meaſure you have conſtructed a table of lunations from 1 to 100,000.

In your laſt publication, you ſuppoſe, with Dr. Halley, the ſolar tropical year to conſiſt of 365 d. 5 h. 48 min. 55 ſec. which is 2 ſeconds leſs than that of Sir Iſaac Newton's.

And you now ſuppoſe, with Dr. Pound, that the length of a mean lunation is 29 d. 12 h. 49 min. 3 ſec. 2 thirds, 58 fourths, 19 fifths, 12 ſixths; and upon this meaſure you have again conſtructed a table of lunations from 1 to 100,000 without aſſigning any reaſon for changing your authorities.

Thus are you toſſed about with every blaſt of doctrine, adopting one meaſure to-day and another to-morrow.

Thus then ſtands the caſe. With reſpect to the determinate length of the ſolar tropical year, Sir Iſaac Newton ſays *ſo*, Dr. Halley ſays *ſo*. With reſpect to the length of a mean lunation, Ptolemy and the Jews ſay *ſo*, Dr. Pound ſays *ſo!*

Now I aſk, what does the ſcholar and diſciple Mr. Ferguſon ſay? *who hath himſelf made ſo many celeſtial obſervations.* Leaving him to anſwer this queſtion at his leiſure, I ſhall proceed to prove,

That Mr. Ferguſon's ſolar and lunar tables can neither confirm the truth of Mr. Kennedy's calculations, nor convict them of error. Here follows

A calculation of the luni-ſolar characters, or diſtance of the mean full moon before the autumnal equinox A. D. 1763, A. M. 5770, and the correſponding day of the week.

5770 ſolar tropical years include 71365 lunations; but before I reduce them reſpectively to days, I muſt ſtate the three following caſes, one of which muſt ever happen, if the true year of the world be given.

1ſt caſe. If the days of the *lunar reduction* be *leſs* than the ſolar, the difference will expreſs the diſtance of the mean full moon day, either compleated, or in great part compleated, *before* the autumnal equinox.

2d caſe. If the days of the *ſolar tropical reduction* are *leſs* than the days of the lunar, the difference will expreſs the diſtance of the mean full moon day *after* the autumnal equinox.

3d. caſe. If the days of the lunar reduction are *equal* to the days of the tropical ſolar, then the day of the autumnal equinox will be coincident with the mean full moon day, but the epact muſt be found by a horary and minutary calculation.

To find the number of days in 5770 ſolar tropical years.

Multiply - 5770 mean Julian years of 365 d. 6 h.
into - - 11 minutes.

5770
5770
D. H. M.
Divide the product by 1440′) 63470 (44 1 50 the Jul. exceſs, or retroceſſion.
5760

5870
5760
H.
Divide the remainder by 60′) 110 (1

Remain - 50′

Multiply - 5770 mean Julian years,
into - - 1461 quadrants, or fourth parts of a day.

5770
34620
23080
5770
D. H. M.
Divide the product by 4) 8429970 (2107492 12 00 the Julian reduction.
Subſtract the Jul. exceſs, or retroceſſion 44 1 50

To the ſolar tropical reduction 2107448 10 10 ☉ in ♎, firſt meridian, [A.D. 1763.
Add for the meridian of the Greenwich obſervatory - - } 10 24

2107448 20 34 p. m.
Reduce the hours to midnight + 1–12

2107449 8 34 ☉ in ♎, at Greenwich, [A.D. 1763.

To find the correſponding day of the week.

Divide by 7) 2107449 (301064

Remainder 1 | index 5 | day of the week, Friday. [vid. Tab. p. 157. Kennedy's *Syſtem. of Chron.*]

It

It appears, by theſe calculations, that in this current year of our Lord 1763, the ſun will come to the autumnal equinox, in the meridian of the Greenwich obſervatory, 20 h. 34 min. after noon; or 8 h. 34 min. after midnight, upon a Friday, which is the 5th day after Sunday excluſive, as the index ſhews.

Here the chronologiſt notes, that the ſun has never entered the firſt point of libra, on the ſame hour and minute of the day, on the ſame day of the week, in the ſame year after biſſextile, in the ſame place, once ſince the creation; and my opponent, Mr. Ferguſon, is to prove that it has.

The LUNAR COMPUTATION.

Divide 5770 years by 19; the quotient will give 303 compleat cycles, and leave in remainder 13 years of the 304th.

There are in 12 luni-ſolar years 235 lunations.

Multiply 303 compleat cycles into 235 lunations, and to the product 71205 add 156 for 13 remaining years, and the ſum will be 71361; add 4 for intercalary months, then the whole amount of lunations will be 71365.

12 lunations make a common lunar year; in 30 common lunar years there are 10631 days, and 00 h. 10 min. 30 ſec. Theſe 10 min. 30 ſec. muſt be thrown off by a principle of Aſtronony, which I leave my opponent to explain.

To find the number of compleat days in 71365 lunations.

In the ſolar-tropical reduction of 5770 years there are 2107448 entire days.

	D. D.	
Divide by 10631)	2107448	(198 periods, each conſiſting of [30 common lunar years.
	104434	
	95679	
	87558	
	85048	
Divide by 354)	2510	(7 lunar years.
Subſtract -	2478	
From the remainder - -	32	
Subſtract for lunar years of 355 days	2	
Remains 1 full moon lunation	30	
Subſtract for 1 lunation -	30	
Remains the note of coincidence	0	

Another method of finding the note of coincidence.

There are in 30 common lunar years 19 of 354, and 11 of 355 days. Multiply 198 periods into 11, and to the product 2178, add 2, and the whole amount of lunar years, conſiſting of 355 days, will be 2180.

From the days of the ſolar tropical reduction	2107448	
Subſtract for lunar years of 355 days -	2180	
Divide the remainder by 354)	2105268	(5947 lunar years.
	1770	
	3352	
	3186	
	1666	
	1416	
	2508	
	2478	
From the remainder	30	
Subſtract for 1 lunation	30	
Remains the note of coincidence	0	

Multiply -	5947	lunar years,
into - -	354	the number of days in a common [lunar year.
	23788	
	29735	
	17841	
To the product -	2105238	
Add for lunar years of 355 days	2180	
To the ſum -	2107418	
Add for a lunation -	30	
The ſum -	2107448	

From the compleat days of the ſolar tropical reduction	2107448
Subſtract the compleat days of the lunar -	2107448
The difference -	0000000

It appears, therefore, by theſe calculations, that A. D. 1763, A. M. 5770 ending, the day of the autumnal equinox will be coincident with the day of the ſull moon.

Here let it be obſerved, that to obtain the day of the week, we muſt add 1 to both reductions, to bring it to our own meridian, which lies 156 degrees to the eaſtward of the firſt meridian.

I will now collect, and ſet in one view the ſeveral characters which will meet together in this current year of our Lord 1763.

I ſay then, that the ſun will come to the autumnal equinox, 1ſt. on a full moon day; 2dly. upon a Friday in our meridian; 3dly. in the third year after biſſextile; 4thly. in the 13th year of the 304th decennoval cycle, reckoned from the radical year.

From hence ariſes this queſtion, and it is a very important queſtion in the ſyſtem of chronology, What ſpace of time will it require, upon the principles of aſtronomy, to bring theſe four characters together again!

My opponent, Mr. Ferguſon, ſhall himſelf give an anſwer to this important queſtion, whilſt I ſhall only ſtand by, and ſilently admire the force and ſtrength which he has given to it, in his Treatiſe of Aſtronomy, 2d edit. p. 198.

“ If it could be proved,” ſays Mr. Ferguſon, “ from the writings of
“ Moſes, that the ſun was created on the point of the autumnal equinox, and
“ the moon in oppoſition, as well as it can be proved that theſe luminaries
“ were made on (or, according to ſome, did not ſhine out till) the fourth day
“ of the creation-week, there would be *data* enough for aſcertaining the age
“ of the world; for ſuppoſing the moon to be full on an equinoctial day,
“ which was the fourth day of the week, it would require many thouſands
“ of years to bring theſe three characters together again. For the ſooneſt
“ in which the moon returns to new or full on the ſame days of the months
“ as before, is 19 years wanting an hour and half; but then the days of
“ the week return not to the ſame day of the month in leſs than 28 years;
“ in which time the moon has gone through one courſe of lunations, and 9
“ years over; and therefore a coincidence of the full moon, and day of the
“ week and month, cannot happen in that time; and if we multiply 19 by
“ 28, which is the neareſt coincidence of theſe three characters, namely,
“ 532 years; the moon's falling back an hour and half every 19 years, will

“ amount

" amount to 42 hours in ſo many years; and the equinox will have anticipated " 5 days. From all which we may venture to ſay, that 200,000 years will " not be ſufficient to bring all theſe circumſtances together again."

This is the moſt ſhining paragraph in your book, it does credit to your performance; honeſtly ſpeak the truth, did you learn it from your illuſtrious maſter Newton? or, did you happily collect it, as I did, from the writings of my divinely-illuſtrious maſter Moſes? or, did you deign to purloin it from me his humble commentator? as you moſt certainly did. Be this as it may, it will bear teſtimony againſt its *cavilling* author, in ſupport of Mr. Kennedy's ſyſtem of chronology, *as long as the ſun and moon endureth.*

To find the epact, or the mean diſtance of the full moon before the next autmmnal equinox, by calculation from the radical year of the Julian period 706, *through a ſeries of* 71365 *lunations.*

Here let it be noted, that an exceſs or defect of 1 ſecond of time, in the tabular meaſure, if it be multiplied into 71365, will produce a difference in the mean time of full moon of 19 h. 49 min. 25 ſec. ſo indiſpenſably neceſſary is an indefectible meaſure of a mean lunation in calculations of this kind.

71365 lunations being reduced by my tables, will produce 2107449 d. 13 h. 1 min. 28 ſec. 45 thirds; from which I muſt ſubſtract 2 days, and ſo muſt Mr. Ferguſon ſubſtract 2 days from his reductions, how much ſoever he may ſlight the reaſons which I have aſſigned for it in my book, and there will remain the corrected numbers 2107447 d. 13 h. 1 min. 28 ſec. 45 th.

	D.	H.	Min.	Sec.	Th.
From the ſolar tropical reduction	2107448	10	10	00	00
Subſtract the corrected lunar	2107447	13	1	28	45
Remains the mean aſtron. F.M. epact	0	21	8	31	15 ⊙ in ≏ A.D. 1763

If this quantity of the epact, calculated through ſuch a long ſeries of lunations, be not thought a ſufficient teſt of the truth and exactneſs of any ſolar and lunar tables, then ſurely we may ſay, that all the eclipſes of the ſun and moon, which have happened ſince the creation, cannot be offered as any teſts at all. And indeed, they who cannot aſcertain by calculation through the given number of lunations, the epact in this diminutive quantity, will but betray their ignorance of the requiſites, ſhould they attempt to calculate any ancient eclipſe at all.

I ſhall not, Mr. Ferguſon, make theſe reductions by your tables my ſelf, it may be thought invidious in me to do it, and therefore I conſign this taſk over to you; It being more proper for you to make the experiment yourſelf; I ſhall only tell you, that your ſolar and lunar tables, ſo *imperfect* do I find them, can neither confirm the truth of my calculations, nor convict them of error.

If you do not take an opportunity to refute theſe confident aſſertions, I ſhall conclude, that you entertain the ſame opinion yourſelf, and are become a convert to my ſcheme.

N. B. When you have given me a convincing proof of the truth of your ſolar and lunar tables, that is, of Dr. Halley's and Dr. Pound's numbers, by a calculation of the mean full moon epact, at the next autumnal equinox, from the radical year of the Julian period 706, through a ſeries of 71365 lunations, and ſhall find it by ſubſtraction to be leſs than 24 hours, as in fact it will be; then, for a farther trial of them, I ſhall propoſe to you three notable facts more, namely,

1ſt. A remarkable eclipſe of the ſun, which will be obſerved at London on the 1ſt of April, between 10 and 11 o'clock in the morning, A. D. 1764, which we are to calculate, Julian month, day of the month, day of the week, hour and minute at London; ſun's place, moon's place, ſun's apogee, moon's apogee, place of the node, ſun's diſtance from the node, and all from the radical year of the Julian period 706, through a ſeries of 71371 lunations and a half.

2dly. A total eclipſe of the moon, ſaid, by Ptolemy, to have been obſerved at Babylon, in the ſecond year of the reign of Mordac Empadus, about the vernal equinox, which we are to calculate, Egyptian month, day of the month, day of the week, hour and minute at Babylon, &c. from the radical year of the Julian period 706, through a ſeries of 41885 lunations.

3dly. Another antient eclipſe of the moon, obſerved by Ptolemy at Alexandria, and it happened, as I find it ſet down in a catalogue of eclipſes, about the autumnal equinox, in the year before Chriſt 201; this antient eclipſe of the moon we are to calculate, Egyptian month, day of the month, day of the week, hour and minute, at Alexandria, &c. from the radical year of the Julian period 706, through a ſeries of 47086 lunations; and farther trial of your ſolar and lunar tables, that is, of Dr. Halley's and of Dr. Pound's numbers, the ſcriptural aſtronomical chronologiſt will not require.

P. S. I could wiſh that in the continuation of your remarks you would be more careful to obſerve the diſtinction between the phyſical aſtronomer, and the aſtronomical chronologiſt, which you have confounded. And I could alſo wiſh, that when you are diſpoſed to write an anſwer to this, you would take occaſion, for the better information of your readers, to lay open and explain, in the moſt explicit manner, the minutiæ of that radix, by whoſe imperceptible aſſiſtance I made the above calculations, and was inſtructed rightly to underſtand the reſults. I need not tell you, for you know it well, that without a connection with ſome well-known determinate poſition of the ſun and moon, as true as nature, no exact aſtronomical concluſions can be obtained. But if you will take an attentive review of the foregoing calculations, you will find no appearance, at leaſt no ſpecification of any radix at all. This undeniably has the face of a paradox; and ſuch a paradox! as you, Mr. Ferguſon, will never be able to ſolve, unleſs you can cordially, and with ſome degree of faith too, follow my directions, which I ſhall comprehend in theſe three words, *Search the Scriptures.*

APPENDIX.

UPON a review of Mr. Ferguſon's remarks, and the ſpirit of them, it appears to me, that I may venture to expreſs the conceptions he had formed of my performance, in the following terms. Had Mr. Kennedy, the chronologiſt, only ſimply propoſed his 365 d. 5 h. 49 min. as a *mean meaſure* of the tropical ſolar year, and his 1440 minutes, as a *mean meaſure* of a ſolar day; had he not raſhly impeached the veracity of all our ſolar and lunar tables; had he not flatly denied the inequality of years, the inequality of days, and the neceſſity of ſolar equations in determining the times of equinoxes and ſolſtices in a given place; had he taken along with him the preceſſion of the equinoctial and ſolſtitial points, and even but ſlightly mentioned the equation of the ſun's place, the ſun's mean anomally, or diſtance from its apogee; had he diſcovered the leaſt knowledge of the elements and requiſites, without which no ſolar or lunar eclipſe can be calculated, I might have ſpared myſelf the trouble of animadverting upon his ſcheme.

As to his year of the creation, his numerical calculations, and his chronological proofs, ſince they are not at all conformable to our eſtabliſhed plan, I have taken no notice of them in my Critical Review; no more than I have of his *ſingular hypotheſis* concerning the firſt four days of the creation-week, which he calls *extra days*. Now the reader muſt know that theſe *extra days*, (I ſpeak it in my aſtronomical capacity) were neither ſolar days nor ſidereal days; they could not be ſolar days, becauſe the great luminary, the ſun, had no exiſtence until the fourth day; nor could they be ſidereal days, becauſe neither are the ſtars ſpoken of until the fourth day; but if they were neither ſolar days nor ſidereal days, then I aſk, upon what grounds does he call them *natural days?* or, why does he affirm that they had a *real exiſtence?* I ſhall viſit him again in the next review, and I here give him my word, that I will never ſuffer ſuch an unnatural hypotheſis, ſuch an inexplicable dogma to be impoſed upon the public for a *true literal interpretation* of the Moſaic coſmogeny.

In the mean while, I who have advanced this *ſingular hypotheſis*, beg leave to offer a word or two; I ſay then,

1ſt. If it can be proved that the firſt four days of the creation-week, which I have called *extra days*, not *muſt* have been upon the known principles of aſtronomy, but *actually were*, by the hiſtorical relation of Moſes, either ſolar days, or ſidereal days, in the ſenſe that theſe terms are now generally underſtood, then it muſt be allowed, that ſuch proof will effectually refute my *literal interpretation* of the Moſaic coſmogeny.

I have introduced no principles of philoſophy into my explications, nor have I perplexed either myſelf or others, with the ſubtilties of metaphyſics; I only ſay, that the Hebrew words, Or, *light*, and Maor, *luminary*, convey very diſtinct ideas to my mind; the text explicitly declares, that God cauſed the *light* to ſhine out of *darkneſs*, ere we read either of the *greater luminary*, or of the *leſſer luminary* in the expanſe of the heavens. The text ſpeaks of *evening* and *morning*, of *night* and *day*, and conſequently of viciſſitude and ſucceſſion: but where there is viciſſitude and ſucceſſion, there muſt be *motion*: but becauſe the phraſe, *let them be for days and years*, does not occur until the fourth day, I infer from hence, that this *motion* denotes the *revolution* of the whole maſs of the yet uninformed earth, covered with the deep abyſs of waters, as with a garment, antecedent to its annual motion. I ſay farther,

2dly. If the four firſt days of the creation-week, which I have called *extra days*, (whatever might have been their quality or quantity, I being immediately concerned only with their numbers, as a chronologiſt) can, by any calculations whatſoever, be made to fall within the limits of time, as it is now meaſured and computed by the earth's *diurnal motion*, in union with its *annual*; then let it be ſaid, that inſtead of a ſcriptural ſcheme, I have only amuſed the reader with my own fictions and fancies, becauſe the Moſaic account, as I have underſtood and explained it, will give no ſanction, no teſtimony to its truth.

I have been ſo far from philoſophyſing, that I only conſider Moſes as hiſtorically relating, in plain ſimple ſtyle, matter of fact; and I prove, by calculation, that my interpretation of ſuch matter of fact is true; which whoever is inclined to oppoſe, muſt prepare to contend with more than two millions of proofs that may be given.

See the table, (Syſtem of Chronology, p. 157) and the many calculations I have made under its never-failing directions.

F I N I S.